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EXAMINER	
WOZNIAK, JAMES S	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,954	WHITMAN ET AL.	
	Examiner	Art Unit	
	James S. Wozniak	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) *19-26 and 44-48* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 27-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the office action from 9/13/2005, the applicant has submitted a request for continued examination, filed 10/19/2005, amending claims 4, 15, 30, and 41, while arguing to traverse the art rejection based on the limitation regarding a multi-stage audio classifier *(Amendment, pages 11-12)*. Applicant's arguments have been fully considered, however the previous rejection is maintained due to the reasons listed below in the response to arguments.

Response to Arguments

2. The applicant's arguments have been fully considered but they are not persuasive for the following reasons:

With respect to the **independent claims**, the applicant argues that Soltau et al *("Recognition of Music Types," 1998)* fails to teach a multi-stage classifier having a first stage that generates a metalearner vector that is used by a final stage metalearner classifier to generate an audio classification *(Amendment, Pages 11-12)*. In response, the examiner points out that Soltau teaches a system for music classification having a first stage temporal structure classification that generates a characteristic learning vector that is utilized by a final neural network classification stage *(Pages 2-3, Section 2.3 and Fig. 1)*. As presently claimed, the current invention requires that an initial classifier produce a metalearner vector to be used by a

final stage classifier. With respect to Soltau, the temporal analysis means characterizes (classifies) a piece of music according to its temporal features and then further classifies music features according to an n best algorithm. The temporal classification process taught by Soltau results in a learning vector that is used in a final neural network classifier. Thus, since Soltau teaches a temporal analysis classification process for generating a learning vector for use in a final neural network classifier, Soltau teaches the claimed "first stage classifier" used to "generate a metalearner vector."

In response to applicant's argument that the present invention does not use a multi-stage classifier for vector dimension reduction *(Amendment, Page 12)*, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

With respect to the applicant's arguments that the prior art of record fails to show certain features of applicant's invention, it is noted that the features upon which applicant relies *(i.e., a first stage of support vector machines, one for each musical artist to be classified, used to generate a metalearner vector that allows a final stage neural network classifier to classify music according to a musical artist, Amendment, Page 12)* are not recited in the aforementioned claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The examiner further points out that a claim amendment incorporating a combination of all of the above noted features into the independent claims may overcome the prior art of record.

The applicant's arguments regarding **claims 4 and 30** *(Amendment, Page 12)* are moot due to the new grounds of rejection in view of Toklu et al *(U.S. Patent: 6,697,564)*.

With respect to **Claims 7 and 33**, the applicant argues that Rossum et al (U.S. Patent: 5,763,800) fails to teach subdividing slices of audio data for effective machine learning *(Amendment, Page 12)*, however the examiner points out that such a limitation is noted in the previous office action as being taught by Matityaho *("Neural Network Based Model for Classification of Music Type," 1995) (prior office action, page 4)*. The teachings of Rossum *(Col. 12, Lines 27-35)* are relied upon to provide the well known concept of doubling frequency data to obtain a higher pitch (golden ratio of frequency), and when taken in combination with Matityaho and Soltau, teach the subject matter disclosed in claims 7 and 33.

With respect to **Claims 8 and 34**, the applicant argues that Goldin *(U.S. Patent: 5,969,654)* fails to teach selecting frequency bands for use by a machine learning classifier *(Amendment, Pages 12-13)*, however the examiner points out that such a limitation is noted in the previous office action as being taught by Matityaho *("Neural Network Based Model for Classification of Music Type," 1995) (prior office action, page 4)*. The teachings of Goldin *(Col. 3, Lines 33-47)* are relied upon to provide the concept of setting an 11khz cutoff frequency for satisfactorily describing music data, and when taken in combination with Matityaho and Soltau, teach the subject matter disclosed in claims 8 and 34.

Regarding **claims 9 and 35**, the applicant argues that Dumais et al *(U.S. Patent: 6,192,360)* is non-analogous art (Amendment, Page 13). In response the examiner points out that it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was

concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the reference is from a similar field of endeavor in pattern classification *(prior office action, page 8)*. In fact, Dumais notes that all pattern classification fields are related art and further cites the particular field of sound classification *(Col. 1, Lines 15-23)*. Thus, Dumais is analogous art and is obvious in combination with Soltau and Matityaho for the benefit of providing more accurate pattern classification *(Col. 4, Lines 51-54)*.

With respect to **Claims 12 and 38**, the applicant argues that Yoda (U.S. Patent: 5,479,575) fails to teach an input and output node for each classification category *(Amendment, Page 13)*. In response the examiner points out that that the neural network structure taught by Yoda features an equal number of input and output nodes each corresponding to a unique classification *(Col. 6, Lines 58- Col. 7, Line 19; and Fig. 5)*. Yoda further discloses that the neural network means may be applied to audio classification *(Col. 6, Lines 61-62)*. With respect to the applicant's further arguments that the prior art of record fails to show certain features of applicant's invention, it is noted that the features upon which applicant relies *(i.e., musical artist categories corresponding to each input and output node, Amendment, Page 13)* are not recited in the aforementioned claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

With respect to **Claims 14 and 40**, the applicant's arguments *(Amendment, Page 13)* fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims

define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-6, 11, 15, 17, 27-32, 37, 41, and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al *("Neural Network Based Model for Classification of Music Type," March 1995)* in view of Soltau et al *("Recognition of Music Types," 1998)*.

With respect to **Claims 1 and 27**, Matityaho discloses:

Processing the audio signal into a perceptual representation of its constituent frequencies *(frequency analysis, Pages 1-2, Section IIA)*;

Processing said perceptual representation into at least one learning representation of said audio data stream *(successive vectors representing music intervals, Pages 1-2, Section IIA)*;

Inputting at least one said learning representation into a multi-stage classifier, whereby said multi-stage classifier extracts classifying data from said learning representations and outputs the classification of said audio signal *(neural network input, Pages 1-2, Section IIA, and decision, Fig. 1, Page 2, Section IIB)*.

Matityaho does not specifically teach that a multi-stage classifier comprises one or more first stage classifiers for generating a metalearner vector and a final state metalearner classifier, however Soltau discloses a process of vector classification according to event counting to produce a learning vector for input into a neural network for music classification *(Pages 2-3, Section 2.3 and Fig. 1)*.

Matityaho and Soltau are analogous art because they are from a similar field of endeavor in music classification. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with the additional vector processing taught by Soltau in order to implement more efficient learning in a neural network through vector dimension reduction *(Soltau, Page 3, Section 2.3)*.

With respect to **Claims 2 and 28**, Matityaho recites:

The step of processing the audio data into a perceptual representation of its constituent frequencies comprises calculating, for a time sample window of a digital representation of said audio signal, a Fast Fourier Transform function *(FFT, Pages 1-2, Section IIA)*.

With respect to **Claims 3 and 29**, Matityaho discloses:

The step of processing said perceptual representation into at least one learning representation further comprises dividing said perceptual representation into a plurality of time slices *(successive vectors representing music intervals, Pages 1-2, Section IIA)*.

With respect to **Claims 5 and 31**, Matityaho discloses:

The step of dividing the perceptual representation into learning representations further comprises dividing said perceptual representation into a plurality of frequency bands *(frequency segments having a frequency separation, Pages 1-2, Section IIA, and Page 5, Section IV)*.

With respect to **Claims 6 and 32**, Matityaho in view of Soltau teaches the method and system for music classification utilizing multiple frequency bands as applied to Claim 5. Matityaho in view of Soltau does not teach dividing a musical signal into 20 frequency bands, however, it would have been obvious matter of design choice to do so, since the applicant has not disclosed that the use of dividing a music signal into 20 frequency bands solves any stated problem or is for any specific purpose other than the fact that it is chosen based upon trial and error testing *(specification, paragraph 29)*. The use of the 20 frequency bands for music signal division is akin to optimizing the values of a result effective variable (in this instance 20 frequency bands was determined as an optimal band number for effective machine learning through trial and error testing). Therefore, determining the optimal value of a result effective variable would have been obvious and ordinarily within the skill of the art. **In re Boesch**, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

With respect to **Claim 11 and 37**, Soltau further recites:

The final stage of said multi-stage classifier comprises a neural network *(neural network, Fig. 1)*.

With respect to **Claims 17 and 43**, Matityaho recites:

Measuring the confidence of said classification by said multi-stage classifier *(success rate, Page 4, Section IIIB)*.

5. **Claims 4 and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al *("Neural Network Based Model for Classification of Music Type," March 1995)* in view of Soltau et al *("Recognition of Music Types," 1998)*, and further in view of Toklu et al (U.S. Patent: 6,697,564).

With respect to **Claims 4 and 30**, Matityaho in view of Soltau teaches the method and system for music classification capable of dividing an input musical signal into successive vector intervals as applied to Claim 3. Matityaho in view of Soltau do not specifically suggest that the time segments are from 0.8 to 1.2 seconds in length, however Toklu teaches a method and system for audio classification utilizing 1.2 second time segments *(Col. 3, Lines 11-22)*.

Matityaho, Soltau, and Toklu are analogous art because they are from a similar field of endeavor in audio classification. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho in view of Soltau with the 1.2 second audio time segments taught by Toklu in order to provide proper audio segment length for audio classification and labeling *(Toklu, Col. 3, Lines 3-22)*.

6. **Claims 16, 18, and 42** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau, and further in view of the applicant's admitted prior art.

With respect to **Claims 16 and 42**, Matityaho teaches the method and system for music classification as applied to Claim 1 and further teaches the sampled music input as shown in Fig. 1. Although Matityaho does not teach that the sampled signal was obtained using pulse code modulation, it is the applicant's admitted prior art that pulse code modulation is a very common and well-known method of representing an analog audio input as a series of digital audio samples in the audio processing art. Thus, it would have been obvious to one of ordinary skill in the art, at the time of invention, to utilize PCM to obtain the music samples as shown in Fig. 1 of Matityaho to provide an easily implanted means of obtaining a sampled digital audio signal since

the means for performing such a method step are well-known in the audio processing art and readily available.

With respect to **Claim 18**, Matityaho recites the method for music classification as applied to Claim 1. Also, although Matityaho does not specifically suggest method storage on a computer readable medium, it is that applicant's admitted prior art that it would have been obvious to one of ordinary skill in the art, at the time of invention, to store the music classification method taught by Matityaho on a computer readable medium to increase method compatibility and usability by providing a means for method use with multiple computer systems.

7. **Claims 7 and 33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau et al, and further in view of Rossum et al *(U.S. Patent: 5,763,800)*.

With respect to **Claims 7 and 33**, Matityaho in view of Soltau teaches the method and system for music classification utilizing frequency band segmentation as applied to Claim 5. Matityaho in view of Soltau does not specifically teach that frequency bands grow according to the golden ratio of frequency with respect to pitch; however, Rossum discloses:

The size of each of said frequency bands grows according to the golden ratio of frequency with respect to pitch *(frequency doubling with each octave, Col. 12, Lines 27-35)*.

Matityaho, Soltau, and Rossum are analogous art because they are from a similar field of endeavor in music data processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho in view of Soltau

with the teaching of frequency band doubling with increasing octaves as disclosed by Rossum to provide further perceptual processing for music classification by separating a musical signal into various frequency bands that are indicative of musical notes (Rossum, Col. 12, Lines 30-35, and Col. 3, Lines 58-62).

8. **Claims 8 and 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau et al, and further in view of Goldin *(U.S. Patent: 5,969,654)*.

With respect to **Claims 8 and 34**, Matityaho in view of Soltau et al teaches the means for dividing a frequency analysis result into frequency segments, as applied to Claims 5 and 31. Although Matityaho in view of Soltau et al does teach a maximum frequency of 20kHz based on the upper limits of human hearing (Page 1, Section IIA), a maximum of 11kHz is not specifically disclosed in the aforementioned prior art, however Goldin teaches a cutoff frequency of 11kHz *(Col. 3, Lines 33-47)*.

Matityaho, Soltau, and Goldin are analogous art because they are from a similar field of endeavor in music data processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho with a cutoff frequency of 11kHz as taught by Goldin to conserve system resources by processing only a necessary frequency range since a frequency bandwidth of up to 11KHz is satisfactory for describing music data *(Goldin, Col. 3, Lines 37-40)*.

9. **Claims 9-10 and 35-36** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau et al, and further in view of Dumais et al *(U.S. Patent: 6,192,360)*.

With respect to **Claims 9 and 35**, Matityaho in view of Soltau et al teaches the method and system for music classification as applied to Claim 1. Matityaho in view of Soltau et al does not teach the use of a support vector machine as a first stage of a multi-stage classifier, however Dumais recites:

First stage of said multi-stage classifier comprises at least one Support Vector Machine (use of support vector machines in pattern classification, Col. 10, Line 66- Col. 11, Line 15).

Matityaho, Soltau, and Dumais are analogous art because they are from a similar field of endeavor in pattern classification. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho in view of Soltau et al with the use of a support vector machine as a first stage of a multi-stage classifier as taught by Dumais to provide more accurate pattern classification through the use of a support vector machine *(Dumais, Col. 4, Lines 51-54)*.

With respect to **Claims 10 and 36**, Dumais further discloses:

Multi-stage classifier comprises at least one Support Vector Machine per category of classification *(Col. 10, Line 66- Col. 11, Line 15)*.

10. **Claims 12-13 and 38-39** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau et al, and further in view of Yoda *(U.S. Patent: 5,479,575)*.

With respect to **Claims 12 and 38**, Matityaho in view of Soltau et al teaches the method and system for music classification utilizing a neural network as applied to Claim 11. Matityaho in view of Soltau et al does not specifically suggest that the implementation of at least one input and output neural network nodes for each classification category, however, Yoda discloses:

The neural network comprises at least one input node per category of classification, and further wherein said neural net comprises at least one output node per category of classification *(Col. 6, Line 58- Col. 7, Line 19, and Fig. 5)*.

Matityaho, Soltau, and Yoda are analogous art because they are from a similar field of endeavor in neural network based pattern recognition. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho in view of Soltau et al with the implementation of at least one input and output neural network nodes for each classification category as taught by Yoda to provide an organized and reliable means of pattern classification since each class has an associated input and output node utilizing in determining a most likely pattern classification based on the neural network output *(Yoda, Col. 5, Line 3-28)*.

With respect to **Claims 13 and 39**, Matityaho additionally discloses:

The neural network comprises a hidden layer, wherein said hidden layer comprises at least as many nodes as the number of said input nodes *(hidden layer, Page 2, Section IIB)*.

11. **Claims 14 and 40** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau et al, and further in view of Kramer et al *(U.S. Patent: 5,335,291)*.

With respect to **Claims 14 and 40**, Matityaho in view of Soltau et al teaches the method and system for music classification utilizing a neural network as applied to Claim 11. Matityaho in view of Soltau et al does not specifically suggest that the neural network operates on a Gaussian activation function, however Kramer discloses such a configuration *(Col. 4, Liens 33-44)*.

Matityaho, Soltau, and Kramer are analogous art because they are from a similar field of endeavor in neural network based pattern recognition. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Matityaho in view of Soltau et al with the neural network configuration utilizing a Gaussian activation as taught by Kramer in order to implement a more detailed and thorough method of pattern recognition through the use of activation rules which provide a mathematical description of how each node in the neural net processes information *(Kramer, Col. 1, Lines 38-47)*.

12. **Claims 15 and 41** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matityaho et al in view of Soltau et al, and further in view of Logan et al *(U.S. Patent: 6,931,451)*.

With respect to **Claims 15 and 41**, Matityaho in view of Soltau teaches the system for music classification utilizing a neural network as applied to Claim 1. Matityaho in view of Soltau does not specifically suggest artist classification, however Logan teaches a means for recognizing (classifying) a musical artist *(Col. 13, Lines 16-28)*.

Matityaho, Soltau, and Logan are analogous art because they are from a similar field of endeavor in audio classification. Thus, it would have been obvious to a person of ordinary skill

in the art, at the time of invention, to modify the teachings of Matityaho in view of Soltau with the means for classifying a musical artist as taught by Logan in order to implement a musical broadcast filter that stores music data only having select artist attributes *(Logan, Col. 13, Lines 16-28)*.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Kenyon et al *(U.S. Patent: 4,843,562)*- teaches a two-stage method for classifying audio data.

Scott *("Music Classification Using Neural Networks," 2001)*- teaches a method for classifying music by artist using a neural network.

Pye *("Content-Based Methods for the Management of Digital Music," 2000)*- teaches a system for music classification utilizing a decision tree having classes for various musical artists.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak
11/30/2005

SUSAN MCFADDEN
PRIMARY EXAMINER